

# Examination of Nonorganic Neurologic Disorders

## KEY TEACHING POINTS

- Traditional clues to nonorganic disease are findings whose severity fluctuates during the examination, findings that defy neuroanatomic explanation, and bizarre movements not normally seen in organic disease.
- Of the many nonorganic neurologic signs, the best validated ones are the chair test (for gait disorders), the knee-lift test (for paraparesis), the drift-without-pronation test (for unilateral arm weakness), and the Hoover test (for unilateral leg weakness).
- Nonetheless, some patients with organic disease also have “nonorganic” findings, rare disorders may trip up the unwary clinician, and some patients with “nonorganic” findings later develop organic disease that accounts for their findings. For these reasons, confirmation of nonorganic disease is best left to neurologic specialists.

## I. TRADITIONAL PHYSICAL FINDINGS OF NONORGANIC DISEASE

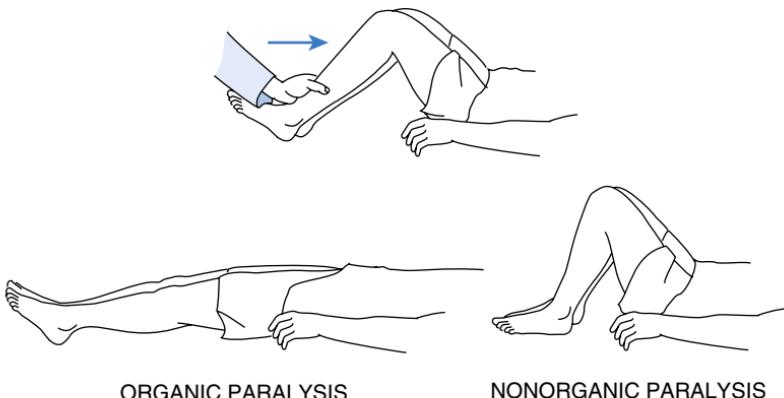
Nonorganic neurologic disorders (also called hysterical, psychogenic, or functional disorders) occur commonly, accounting for up to 9% of admissions to a neurologic service<sup>1</sup> and 30% of outpatient referrals to neurologists.<sup>2</sup> Of the many proposed findings of nonorganic neurologic disease,\* the most prominent are findings whose severity fluctuates during the examination, findings that defy neuroanatomic explanation, bizarre movements not normally seen in organic disease, and findings elicited during special tests.

### A. FINDINGS WHOSE SEVERITY FLUCTUATES DURING THE EXAMINATION

Examples are the patient who falls suddenly while walking but catches himself or herself with knees and hips flexed, a position that requires considerable strength, or the patient whose stance is unstable until he or she is distracted when asked to perform the finger-nose test.<sup>5</sup>

Two examples of formal bedside tests designed to demonstrate fluctuating findings are the knee-lift test (Fig. 69.1) and chair test. The chair test is used in patients with gait disorders. The clinician first asks the patient to walk 20 to 30 feet and back again

\*Review articles by Stone,<sup>3</sup> Lanska,<sup>4</sup> and Daum<sup>5</sup> exhaustively review nonorganic neurologic signs.



**FIG. 69.1 KNEE-LIFT TEST FOR NONORGANIC PARAPARESIS.** The knee-lift test is designed to test patients with leg weakness from suspected spinal cord lesions; it is interpretable only if the supine patient cannot lift his or her knees off the examination table. The clinician raises both of the patient's knees (top) and then gently releases the patient's legs. Patients with organic paralysis cannot hold the knees upright (negative test, lower left). If the patient maintains the knees upright, the test is positive (for nonorganic paralysis, lower right).<sup>7</sup>

and then places the patient in a wheeled swivel chair (with back) and asks him or her to propel themselves over the same distance in the chair with their legs. Marked improvement when using the chair (compared with walking) is a positive test.

## B. FINDINGS THAT DEFY NEUROANATOMIC EXPLANATION

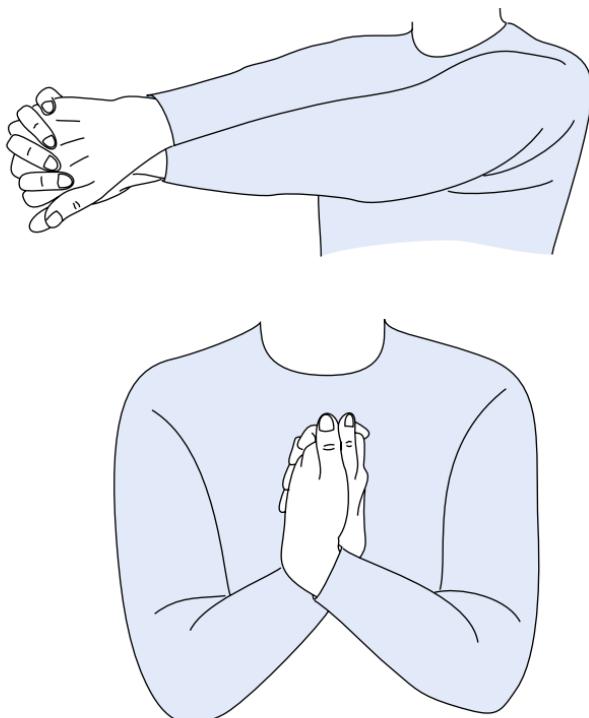
Findings that defy neuroanatomic explanation<sup>8,9</sup> include the following: (1) hysterical hemianopia, as in the patient who has right hemianopia with both eyes open or just the right eye open, but normal visual fields when just the left eye is open<sup>10,11</sup>; (2) wrong-way tongue deviation, which describes a tongue deviating away from the hemiparetic side (in cerebral hemispheric disease, the tongue deviates toward the hemiparetic side; see *Chapter 60*)<sup>12</sup>; and (3) peripheral facial palsy and ipsilateral hemiparesis (if a single lesion causes peripheral facial weakness and hemiparesis, the lesion is in the brainstem and the findings should be on opposite sides of the body).<sup>13</sup>

## C. BIZARRE MOVEMENTS NOT NORMALLY SEEN IN ORGANIC DISEASE

Examples of such movements are the patient who drags a hemiparetic leg as if it were an inanimate object<sup>6,14</sup> or the ataxic patient who sways dramatically without falling.<sup>11</sup>

## D. FINDINGS ELICITED DURING SPECIAL TESTS

Findings elicited during special tests include the following: (1) **Optokinetic nystagmus** (for functional blindness): Because patients with intact vision cannot suppress this nystagmus (see *Chapter 58*), the presence of optokinetic nystagmus reveals that the blindness is functional. (2) **Procedures that confuse the patient regarding sidedness**, such as a maneuver that mixes up the fingers to uncover hysterical hemianalgesia (*Fig. 69.2*).<sup>15</sup> (3) **Upper limb drift without pronation test**: When



**FIG. 69.2 TEST FOR HYSTERICAL HEMIANALGESIA.** This test simply mixes up the fingers and confuses the body image. In the first step (top row), the patient's hands are pronated with the little fingers on top, the palms are outward, and fingers are interlocked. In the second step (bottom row), the hands are rotated downward, inward, and upward, so the interlocked fingers are positioned in front of the chest. The clinician repeats the sensory examination to determine if the patient is consistent in describing his or her sensory loss. In the final position, the fingertips end up on the same side of the body as their respective arms, and the thumbs (which are not interlocked) end up on the side opposite the fingers.

patients with organic unilateral arm weakness are asked to stretch the supinated arms in front of them (palms up) and then close the eyes, the weak arm will slowly drift down *and pronate* (i.e., the palm slowly turns to face downward; see Fig. 61.1 in [Chapter 61](#)). In contrast, the weak arm in patients with nonorganic weakness may drift down *without* pronation. This is the positive test. (4) **The Hoover sign of nonorganic weakness** ([Fig. 69.3](#)), first described by the American physician Charles Hoover in 1908.<sup>16</sup>

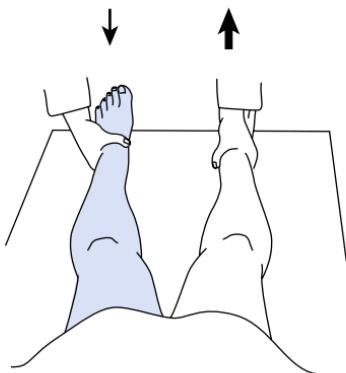
## II. CLINICAL SIGNIFICANCE

### A. DIAGNOSTIC ACCURACY

According to the LRs in [EBM Box 69.1](#), tests of nonorganic weakness are quite accurate: The chair test identifies functional gait disorder (positive likelihood ratio [LR] = 17, negative LR = 0.2), the knee-lift test identifies nonorganic paraparesis

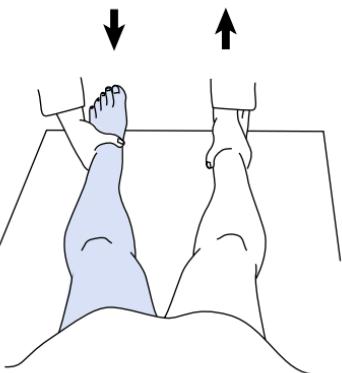
## ORGANIC PARALYSIS

"Lift the sound leg"

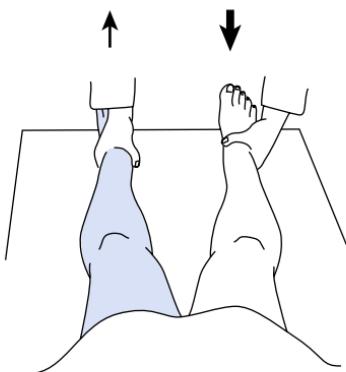


## NONORGANIC PARALYSIS

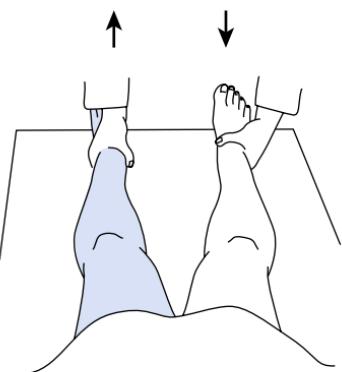
"Lift the sound leg"



"Lift the paralyzed leg"



"Lift the paralyzed leg"



**FIG. 69.3 HOOVER SIGN OF NONORGANIC PARALYSIS.** The left half of the figure depicts organic paralysis and the right half, *nonorganic* paralysis; in each drawing, the patient's right leg is the sound leg and the left leg (shaded blue) is the paretic leg. In the top rows, the clinician stands at the foot of the bed and, with his or her hands around the patient's ankles, asks the patient to *lift the sound leg* as strongly as possible while the clinician resists the movement (the size of arrows indicates the power perceived by the clinician). In organic paralysis, the downward force of the paretic leg is weak; in nonorganic weakness the downward force is paretic leg is strong. Then (in the bottom rows), the patient is asked to lift the *paretic leg* as strongly as possible. In organic weakness, the downward force of the strong leg is strong, whereas in nonorganic weakness the downward force is weak. The Hoover test relies on the principle that strong muscular contractions of healthy persons are involuntarily matched by opposing movements of the opposite limb, unless organic weakness intervenes. The appeal of the Hoover test is that its interpretation relies on observation of the leg opposite of the one being tested (i.e., in the first test—top row—the patient is focused on the sound leg but the clinician observes the paretic leg; in the second test—bottom row—the patient is focused on the paretic leg but the clinician observes the sound leg).

EBM BOX 69.1

## Nonorganic Neurologic Disease\*

Finding (Reference) <sup>†</sup>	Sensitivity (%)	Specificity (%)	Likelihood Ratio‡ if Finding Is	
			Present	Absent
<b>Diagnosing Nonorganic Gait Disorder</b>				
Chair test positive <sup>17</sup>	85	95	17.0	0.2
<b>Diagnosing Nonorganic Paraparesis</b>				
Knee-lift test positive <sup>7</sup>	97	86	7.1	0.04
<b>Diagnosing Nonorganic Arm Weakness</b>				
Arm drift without pronation <sup>18</sup>	98	91	11.4	0.02
<b>Diagnosing Nonorganic Leg Weakness</b>				
Hoover sign posi- tive <sup>5,19,20</sup>	39-85	97-100	42.0	0.3

\*Diagnostic standard: For nonorganic gait disorder, Hayes criteria<sup>17</sup>; for nonorganic paraparesis, disproportionate motor paralysis, nonanatomic sensory loss, and normal neuroimaging; for nonorganic weakness, neurologic examination and observation over time.

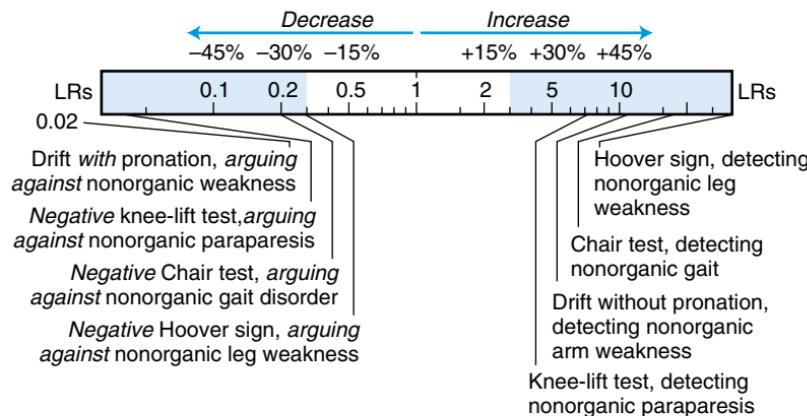
<sup>†</sup>Definition of findings: For the chair test, see text; for the knee-lift test, see Fig. 69.1; for the Hoover sign, see Fig. 69.3.

<sup>‡</sup>Likelihood ratio (LR) if finding present = positive LR; LR if finding absent = negative LR.

[Click here to access calculator](#)

## NON-ORGANIC NEUROLOGIC DISEASE

## Probability



(positive LR = 7.1, negative LR = 0.04), the drift-without-pronation test identifies nonorganic arm weakness (positive LR = 11.4, negative LR = 0.02), and the Hoover sign identifies nonorganic leg weakness (positive LR = 42, negative LR = 0.3). Other investigators have adapted the Hoover sign to develop an analogous test for arm weakness, which has similar diagnostic accuracy.<sup>21</sup> Nonetheless, these impressive LRs likely overestimate diagnostic accuracy because the clinicians performing the tests are also familiar with the final diagnosis, a diagnosis that was in turn probably determined by the same clinician using clinical criteria (see footnote to EBM Box 69.1).

## **B. CAVEATS TO THE DIAGNOSIS OF NONORGANIC DISORDERS**

Clinicians should be reluctant to diagnose nonorganic disease, primarily because many “nonorganic” findings, when subjected to serious study, also appear in patients with organic disease. For example, in studies of patients with known organic disorders, 8% to 15% “split” their sensory findings precisely at the midline, up to 85% feel vibration less in numb areas, 48% have sensory findings that change between examinations or make no sense neuroanatomically, and 5% to 33% have “give-away” weakness.<sup>22-24</sup> All of these findings, at one point in time, have been presented as reliable markers of psychogenic disease.<sup>25</sup>

Rare disorders can also confuse the unwary clinician. For example, patients with medial medullary syndrome may point their tongue to the “wrong” side, patients with advanced Huntington’s disease are often regarded as having a nonorganic gait when it is viewed in isolation,<sup>14</sup> and patients with Marchiafava-Bignami disease (damage to the corpus callosum) may present with a hemianopia that switches sides during examination, depending on the method of testing.<sup>26</sup>

In clinical studies, 6% to 40% of patients given a diagnosis of nonorganic neurologic disease are subsequently found to have genuine organic neurologic disease that accounts for the clinical findings.<sup>27,28</sup> The diagnosis of nonorganic illness is, therefore, a diagnostic snare, best left to the experts who are paid to take on such risks.

*The references for this chapter can be found on [www.expertconsult.com](http://www.expertconsult.com).*

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